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(54) **OLED SUBSTRATE, MANUFACTURING METHOD THEREFOR, AND DISPLAY DEVICE**

OLED-SUBSTRAT, HERSTELLUNGSVERFAHREN DAFÜR UND ANZEIGEVORRICHTUNG

SUBSTRAT OLED, SON PROCÉDÉ DE FABRICATION ET DISPOSITIF D'AFFICHAGE

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Description

FIELD OF THE INVENTION

[0001] The present invention belongs to the field of display technology, particularly to an OLED substrate and a manufacturing method thereof, a display device.

BACKGROUND OF THE INVENTION

[0002] The organic light-emitting device (OLED) has broad application prospects because it has the advantages of simple manufacturing process, low cost, low power consumption, high luminance, wide adaptation range of the working temperature etc.

[0003] The OLED has extremely wide applications in the aspect of display. Specifically, an OLED substrate is taken as an example for illustration. As shown in Fig. 1 and Fig. 2, the OLED substrate comprises a display area 1, and a peripheral area 2 around the display area 1, and the peripheral area 2 comprises a plurality of cathode contact regions 21. A source-drain (SD) metal extending portion 11 is formed on a base substrate 10 of the OLED substrate. The source-drain metal extending portion 11 extends from the display area to the cathode contact regions of the peripheral area. A passivation layer 12 (PVX) is formed on a layer where the source-drain metal extending portion 11 locates, and a plurality of via holes are formed in the passivation layer 12 located in the cathode contact regions. An anode and an anode metal extending portion of the OLED device are formed on the passivation layer 12. The anode of the OLED device is located in the display area, and is arranged in a same layer as the anode metal extending portion 13. The anode metal extending portion 13 also extends from the display area to the cathode contact regions of the peripheral area. The anode metal extending portion 13 is connected with the source-drain metal extending portion 11 at the cathode contact regions through the via holes. A pixel definition layer 14 is formed on the layer where the anode and the anode metal extending portion of the OLED device locate. The pixel definition layer 14 comprises first openings located in the display area and second openings located in the cathode contact regions of the peripheral area. Each of the first openings is used for accommodating the light emitting material of an OLED device. The width of the second opening is much larger than the width of the first opening, and the width of the second opening is even larger than the width of the cathode contact region. After the pixel definition layer 14 is formed, an organic light emitting material layer is formed on the whole OLED base substrate 10 through continuous printing. Because the peripheral area is not used for displaying, here the organic light emitting material at the position of the peripheral area has to be cleaned. Finally the cathode and the cathode metal extending portion of the OLED device are formed. The cathode of the OLED device is located in the display area and is connected with the anode metal extending portion 13. The cathode metal extending portion extends from the display area to the cathode contact regions of the peripheral area.

[0004] US2003184217, US2005179377 or US2011095299 all show cathode contact regions in the periphery of an OLED display the cathode contact regions featuring the pixel definition layer having a groove. The pixel definition layer in the cathode contact region of US2015090966 features several grooves.

[0005] The inventor finds that the prior art at least has the following problems: because the passivation layer 12 in the cathode contact regions has a plurality of via holes, it is very difficult to clean up the light emitting material that falls into the via hole position Q during the process of forming the light emitting material. The first opening in the display area 1 approximately can accommodate 2-6 Q regions as shown in Fig. 2, while Fig. 1 is only a schematic representation. Therefore, how to avoid the organic light emitting material from being formed at positions where the via hole locate is an urgent problem to be solved.

SUMMARY OF THE INVENTION

[0006] The technical problem to be solved by the present invention includes, with respect to the above problem in the existing OLED substrate, providing an OLED substrate, for which the cleaning is convenient and even the step of cleaning up the light emitting material may be omitted, a manufacturing method thereof, and a display device.

[0007] According to an aspect of the present invention, an OLED substrate is provided. The OLED substrate may be divided into a display area and a peripheral area around the display area, the peripheral area having a plurality of cathode contact regions. The OLED substrate comprises: a base substrate, a source-drain metal extending portion arranged on the base substrate, and the source-drain metal extending portion extending from the display area to the cathode contact regions of the peripheral area, a passivation layer arranged on a layer where the source-drain metal extending portion locates, and the passivation layer having a plurality of via holes at positions corresponding to the cathode contact regions, an anode metal extending portion arranged on the passivation layer, and the anode metal extending portion extending from the display area to the cathode contact regions of the peripheral area and being electrically connected with the source-drain metal extending portion through the via holes, a pixel definition layer arranged on a layer where the anode metal extending portion locates, and the pixel definition layer having a plurality of successively arranged first patterns at positions corresponding to the display area, each of the first patterns having a protrusion portion and a groove portion, the pixel definition layer having a plurality of successively arranged second patterns at positions corresponding to the cathode contact regions, each of the second pattern having a protrusion

portion and a groove portion. The protrusion portion of the first pattern corresponds to the groove portion of the second pattern, and the groove portion of the first pattern corresponds to the protrusion portion of the second pattern.

[0008] Optionally, a width of the protrusion portion of the first pattern is same as a width of the groove portion of the second pattern, and a width of the groove portion of the first pattern is same as a width of the protrusion portion of the second pattern.

[0009] Optionally, the OLED substrate further comprises a light emitting material layer, the light emitting material layer is arranged in the groove portion of the first pattern and on the protrusion portion of the second pattern.

[0010] Optionally, the OLED substrate further comprises a cathode and a cathode metal extending portion connected with the cathode. The cathode and the cathode metal extending portion are arranged on the light emitting material layer, and the cathode is arranged in the display area, the cathode metal extending portion extends from the display area to the cathode contact regions of the peripheral area and is connected with the anode metal extending portion through the groove portion of the second pattern.

[0011] Optionally, the OLED substrate further comprises an anode arranged in the display area, and the anode is arranged in a same layer as the anode metal extending portion and is disconnected from the anode metal extending portion.

[0012] According to another aspect of the invention, there is provided a manufacturing method of an OLED substrate, comprising the steps of:

forming, on a base substrate, a pattern comprising a source-drain metal extending portion through a patterning process, the source-drain metal extending portion extending from a display area to cathode contact regions of a peripheral area;

forming a passivation layer on the base substrate where the above step has been performed, and forming a plurality of via holes at positions corresponding to the cathode contact regions in the passivation layer through a patterning process;

forming, on the base substrate where the above steps have been performed, a pattern comprising an anode metal extending portion through a patterning process, the anode metal extending portion extending from the display area to the cathode contact regions of the peripheral area and being electrically connected with the source-drain metal extending portion through the via holes;

forming a pixel definition layer on the base substrate where the above steps have been performed, and forming a plurality of successively arranged first patterns at positions corresponding to the display area in the pixel definition layer through a patterning process, each of the first patterns having a protrusion portion and a groove portion, forming a plurality of successively arranged second patterns at positions corresponding to the cathode contact regions of the peripheral area in the pixel definition layer, each of the second pattern having a protrusion portion and a groove portion, the protrusion portion of the first pattern corresponding to the groove portion of the second pattern, and the groove portion of the first pattern corresponding to the protrusion portion of the second pattern.

[0013] Optionally, a width of the protrusion portion of the first pattern is same as a width of the groove portion of the second pattern, and a width of the groove portion of the first pattern is same as a width of the protrusion portion of the second pattern.

[0014] Optionally, after the step of forming the pixel definition layer, the method further comprises forming a light emitting material layer, the light emitting material layer is formed in the groove portion of the first pattern and on the protrusion portion of the second pattern.

[0015] Further optionally, the light emitting material layer is formed by continuous printing.

[0016] Further optionally, after the step of forming the light emitting material layer, the method further comprises forming a pattern comprising a cathode and a cathode metal extending portion connected with the cathode through a patterning process. The cathode and the cathode metal extending portion are arranged on the light emitting material layer, and the cathode is arranged in the display area, the cathode metal extending portion extends from the display area to the cathode contact regions of the peripheral area and is connected with the anode metal extending portion through the groove portion of the second pattern.

[0017] Optionally, an anode is further formed while forming the anode metal extending portion, and the anode is arranged in a same layer as the anode metal extending portion and is disconnected from the anode metal extending portion.

[0018] According to yet another aspect of the invention, a display device comprising an OLED substrate as described above is provided.

[0019] The present invention has the following beneficial effect:

The pixel definition layer of the present invention has a plurality of successively arranged first patterns at positions corresponding to the display area and a plurality of successively arranged second patterns at positions corresponding to the cathode contact regions of the peripheral area, moreover, the protrusion portion of the first pattern corresponds to the groove portion of the second pattern, and the groove portion of the first pattern corresponds to the protrusion portion of the second pattern; in other words, the first pattern and the second pattern

are opposite patterns. Therefore, when printing a light emitting material in the pixel definition layer by continuous printing so as to form a light emitting material layer of the OLED device, the light emitting material will not be printed into the groove portion of the second pattern while only being left on the protrusion portion of the second pattern, thus the problem of being difficult to clean up the light emitting material falling into positions under the groove portion of the second pattern corresponding to the via holes of the passivation layer is avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is a planar schematic view of an OLED substrate of the prior art and an OLED substrate according to Embodiment 1.

Fig. 2 illustrates comparison between a sectional view of the cathode contact region taken along the line A-A of Fig. 1 and the pixel definition layer of the display area.

Fig. 3 illustrates the comparison between the pixel definition layer of the OLED cathode contact region and the pixel definition layer of the display area according to Embodiment 1 of the present invention.

Fig. 4 is a schematic view of forming a light emitting material layer on the basis of Fig. 3.

Fig. 5 is a schematic view of forming a cathode metal extending portion on the basis of Fig. 4.

[0021] Reference signs: 1-display area; 2-peripheral area; 3-cathode contact region; 10-base substrate; 11-source-drain metal extending portion; 12-passivation layer; 13-anode metal extending portion; 14-pixel definition layer; 15-light emitting material layer; 16-cathode metal extending portion; 100-first pattern; 101-groove portion of the first pattern; 102-protrusion portion of the first pattern; 200-second pattern; 201-groove portion of the second pattern; 202-protrusion portion of the second pattern.

DETAILED DESCRIPTION OF THE INVENTION

[0022] In order to enable the skilled person in the art to understand the technical solution of the present invention better, the present invention will be described in more detail with reference to the drawings and the specific embodiments.

Embodiment 1:

[0023] As shown in Figs. 1 and 3, this embodiment provides an OLED substrate. Because the planar schematic view of the OLED substrate of this embodiment is same as the prior art, both are represented by Fig. 1. The OLED substrate is divided into a display area 1 and a peripheral area 2 around the display area 1. The peripheral area 2 has a plurality of cathode contact regions 21. The OLED substrate of this embodiment comprises: a base substrate 10; a source-drain metal extending portion 11, arranged on the base substrate 10, and the source-drain metal extending portion 11 extending from the display area 1 to the cathode contact regions 21 of the peripheral area 2; a passivation layer 12, arranged on a layer where the source-drain metal extending portion 11 locates, and the passivation layer 12 having a plurality of via holes at positions corresponding to the cathode contact regions 21; an anode metal extending portion 13, arranged on the passivation layer 12, and the anode metal extending portion 13 extending from the display area 1 to the cathode contact regions 21 of the peripheral area 2 and being electrically connected with the source-drain metal extending portion 11 through the via holes; a pixel definition layer 14, arranged on a layer where the anode metal extending portion 13 locates, and the pixel definition layer 14 having a plurality of successively arranged first patterns 100 at positions corresponding to the display area 1, each of the first patterns 100 having a protrusion portion 102 and a groove portion 101, the pixel definition layer 14 having a plurality of successively arranged second patterns 200 at positions corresponding to the cathode contact regions 21 of the peripheral area 2, each of the second pattern 200 having a protrusion portion 202 and a groove portion 201. The protrusion portion 102 of the first pattern corresponds to the groove portion 201 of the second pattern, and the groove portion 101 of the first pattern corresponds to the protrusion portion 202 of the second pattern.

[0024] In this embodiment, the pixel definition layer 14 has a plurality of successively arranged first patterns 100 at positions corresponding to the display area 1 and has a plurality of successively arranged second patterns 200 at positions corresponding to the cathode contact regions 21 of the peripheral area 2, moreover, the protrusion portion 102 of the first pattern corresponds to the groove portion 201 of the second pattern, and the groove portion 101 of the first pattern corresponds to the protrusion portion 202 of the second pattern. In other words, the first pattern 100 and the second pattern 200 are opposite patterns. Therefore, when printing a light emitting material by continuous printing so as to form a light emitting material layer 15 of the OLED device, the light emitting material will not be printed into the groove portion 201 of the second pattern 200 while only being left on the protrusion portion 202 of the second pattern, thus the problem of being difficult to clean up the light emitting material falling into positions Q under the groove portion 201 of the second pattern corresponding to the via holes of the passivation layer 12 is avoided. It should be noted that the continuous printing means printing successively in a row direction or a column direction where the groove portion 101 of the first pattern locates. Since the groove portions

and the protrusion portions of the first pattern 100 and the second pattern 200 have exactly opposite positions, when it is printed to the second pattern 200, the light emitting material can only be printed to the position of the protrusion portion of the second pattern 200. It should be noted that in Fig. 3, the groove portion 101 of the first pattern located in the display area 1 for example can correspond to a size of about 2-6 Q positions. Fig. 3 is only a schematic representation.

[0025] Respective layer structures of a thin film transistor, e.g. a gate layer, a gate insulating layer, an active layer, a source and a drain etc., can also be arranged on the base substrate 10. The source-drain metal extending portion 11 is arranged in a same layer as the source and the drain.

[0026] Optionally, in the OLED substrate according to the embodiment of the present invention, a width of the protrusion portion 102 of the first pattern is same as a width of the groove portion 201 of the second pattern, and a width of the groove portion 101 of the first pattern is same as a width of the protrusion portion 202 of the second pattern. The reason why it is set in such a way is for the sake of avoiding as much as possible the problem of being difficult to clean up the light emitting material falling into the groove portion 201 of the second pattern when forming the organic light emitting material layer.

[0027] As shown in Fig. 4, optionally, the OLED substrate of this embodiment further comprises a light emitting material layer 15. The light emitting material layer 15 is arranged in the groove portion 101 of the first pattern and on the protrusion portion 202 of the second pattern. That is to say, when printing the light emitting material continuously so as to form the light emitting material layer 15, in the display area 1, the light emitting material falls into the groove portion 101 of each first pattern, so as to form a light emitting material layer 15 of each OLED light emitting unit. In the cathode contact regions 21 of the peripheral area 2, the light emitting material falls onto the protrusion portion 202 of the second pattern, thereby enabling the light emitting material to be kept on the protrusion portion 202 of the second pattern while not having to be cleaned up, which improves the production efficiency. Certainly, the light emitting material on the protrusion portion 202 of the second pattern can also be cleaned up. Compared with the existing OLED substrate structure, the difficulty of the cleaning is greatly reduced. Moreover, the material of the pixel definition layer 14 can be a hydrophobic material, hence, when the light emitting material is printed onto the protrusion portion 202 of the second pattern, it will not flow into the groove portion 201 of the second pattern either.

[0028] As shown in Fig. 5, further optionally, the OLED substrate of this embodiment further comprises a cathode, and a cathode metal extending portion 16 connected with the cathode. The cathode and the cathode metal extending portion 16 are arranged on the light emitting material layer 15, and the cathode is arranged in the display area 1. The cathode metal extending portion 16 extends from the display area 1 to the cathode contact regions 21 of the peripheral area 2, and is connected with the anode metal extending portion 13 through the groove portion 201 of the second pattern. Here, a signal required by the cathode can be inputted at the positions of the cathode contact regions 21.

[0029] Optionally, the OLED substrate of this embodiment further comprises an anode arranged in the display area 1. The anode is arranged in a same layer as the anode metal extending portion 13 and is disconnected from the anode metal extending portion 13. It can be understood that each OLED light emitting unit formed on the OLED substrate has a separate anode. Each anode is driven by a thin film transistor in a corresponding pixel unit.

[0030] The structure of the OLED substrate provided by this embodiment solves the problem of being difficult to clean up the light emitting material of the existing OLED substrate.

Embodiment 2:

[0031] This embodiment provides a manufacturing method of an OLED substrate, which can be used for manufacturing the OLED substrate in Embodiment 1. The manufacturing method comprises:

Step I, forming, on a base substrate 10, a pattern comprising a source-drain metal extending portion 11 through a patterning process, the source-drain metal extending portion 11 extending from a display area 1 to cathode contact regions 21 of a peripheral area 2.

[0032] It should be noted that before forming the source-drain metal extending portion 11 on the base substrate 10, the method may further comprise forming respective layer structures of the thin film transistor on the base substrate 10. The source-drain metal extending portion 11 can be formed with the source and the drain of the thin film transistor by one patterning process, so as to simplify the process.

[0033] Specifically, the base substrate 10 in this step for example can be made from a transparent material such as glass, resin, sapphire or quartz, and is precleaned. Subsequently, a source-drain metal film can be formed on the base substrate 10 by sputtering, thermal evaporation or chemical vapor deposition (CVD). Photoresist coating, exposing, developing, etching, and photoresist stripping are performed to the source-drain metal film so as to form a pattern comprising the source-drain metal extending portion 11.

[0034] The material of the source-drain metal film can be one of Mo, MoNb, Al, AlNd, Ti and Cu. Alternatively, the source-drain metal film can be a monolayer or multilayer composite lamination formed by several materials of the above materials. Optionally, it can be a monolayer or multilayer composite film consisting of Mo, Al or an alloy containing Mo, Al.

[0035] Step II, forming a passivation layer 12 on the base substrate 10 where the above step has been per-

formed, and forming a plurality of via holes at positions corresponding to the cathode contact regions 21 in the passivation layer 12 through a patterning process.

[0036] Specifically, in this step, the passivation layer 12 can be formed by means of manufacturing processes such as thermal growth, normal pressure CVD, low pressure CVD, plasma assisted CVD or sputtering. Then, a plurality of via holes penetrating through the passivation layer 12 are formed by performing photoresist coating, exposing, developing, etching, and photoresist stripping on the passivation layer 12.

[0037] The material of the passivation layer 12 can be SiOx, SiNx, HfOx, SiON, AlOx, etc., alternatively, the passivation layer can consist of multilayer films of two or three of the above materials.

[0038] Step III, forming, on the base substrate 10 where the above steps have been performed, a pattern comprising an anode metal extending portion 13 through a patterning process, the anode metal extending portion 13 extending from the display area 1 to the cathode contact regions 21 of the peripheral area 2 and being electrically connected with the source-drain metal extending portion 11 through the via holes.

[0039] Optionally, an anode is also formed in the display area 1 at the same time. The anode is disconnected from the anode metal extending portion 13.

[0040] Specifically, in this step, an electrically conductive film can be deposited by sputtering, thermal evaporation or chemical vapor deposition, and the anode and the anode metal extending portion 13 can be formed through a patterning process. The anode is electrically connected with the drain of the thin film transistor. The anode metal extending portion 13 is electrically connected with the source-drain metal extending portion 11 through the via hole.

[0041] The electrically conductive film can be a structure of ITO/Ag/ITO or a structure of Ag/ITO; alternatively, the ITO in the above structure is replaced with IZO, IGZO or InGaSnO. Certainly, the conductive film can also be formed from an inorganic metal oxide, an organic electrically conductive polymer or a metal material with electrical conductivity and high work function value. The inorganic metal oxide comprises ITO or ZnO. The organic electrically conductive polymer comprises PEDOT:SS, PANI. The metal material comprises gold, copper, silver or platinum.

[0042] Step IV, forming a pixel definition layer 14 on the base substrate 10 where the above steps have been performed, and forming a plurality of successively arranged first patterns 100 at positions corresponding to the display area 1 in the pixel definition layer 14 through a patterning process, each of the first patterns 100 having a protrusion portion 102 and a groove portion 101, forming a plurality of successively arranged second patterns 200 at positions corresponding to the cathode contact regions 21 of the peripheral area 2 in the pixel definition layer 14, each of the second pattern 200 having a protrusion portion 202 and a groove portion 201, the protrusion portion 102 of the first pattern corresponding to the groove portion 201 of the second pattern, and the groove portion 101 of the first pattern corresponding to the protrusion portion 202 of the second pattern.

[0043] Specifically, in this step, the pixel definition layer 14 can be formed by means of coating. Then, through exposure, development etc., a plurality of first patterns 100 are formed at positions corresponding to the display area 1 in the pixel definition layer 14, and a plurality of second patterns 200 are formed at positions corresponding to the cathode contact regions 21 in the pixel definition layer 14.

[0044] The material of the pixel definition layer 14 can be a lyophobic organic fluorine containing material. The width of the protrusion portion 102 of the first pattern for example can be same as the width of the groove portion 201 of the second pattern, and the width of the groove portion 101 of the first pattern for example can be same as the width of the protrusion portion 202 of the second pattern. The reason why it is set in such a way is for the sake of avoiding as much as possible the problem of being difficult to clean up the light emitting material falling into the groove portion 201 of the second pattern when forming the organic light emitting material layer.

[0045] Step V, forming a light emitting material layer 15 on the base substrate 10 where the above steps have been performed, the light emitting material layer being formed in the groove portion 101 of the first pattern and on the protrusion portion 202 of the second pattern.

[0046] Specifically, in this step, the light emitting material layer can be formed by continuous printing.

[0047] Step VI, forming, on the base substrate 10 where the above steps have been performed, a pattern comprising a cathode and a cathode metal extending portion 16 connected with the cathode through a patterning process. The cathode is formed in the display area 1, the cathode metal extending portion 16 extends from the display area 1 to the cathode contact regions 21 of the peripheral area 2 and is connected with the anode metal extending portion 13 through the groove portion 201 of the second pattern.

[0048] Specifically, in this step, the cathode and the cathode metal extending portion 16 connected with the cathode can be formed by sputtering or evaporation.

[0049] The materials of the cathode and the cathode metal extending portion 16 are low work function metal materials, such as lithium, magnesium,, calcium, strontium, aluminum, indium or alloys of the above metals with copper, gold, silver; alternatively, the cathode and the cathode metal extending portion 16 can be composed of a very thin buffer insulating layer (e.g., LiF, $CsCO_3$ etc.) and the above metals or alloys.

[0050] Thus, the OLED substrate is formed.

Embodiment 3:

[0051] This embodiment provides a display device comprising the above OLED substrate. The display de-

vice can be any product or component with the display function such as a mobile phone, a panel computer, a television, a display, a laptop, a digital photo frame, a navigator etc.

[0052] Because the display device of this embodiment comprises the OLED substrate in Embodiment 1, its performance is better.

[0053] Certainly, the display device of this embodiment can also comprise other conventional structures, such as a power supply unit, a display driving unit etc.

[0054] It can be understood that the above embodiments are only exemplary embodiments for explaining the principle of the present invention. However, the present invention is not limited to these. For the ordinary skilled person in the art, various modifications and improvements can be made as long as these modifications and improvements fall within the protection scopes of the present claims.

Claims

1. An OLED substrate, divided into a display area (1) and a peripheral area (2) around the display area (1), the peripheral area (2) having a plurality of cathode contact regions (21),
   wherein the OLED substrate comprises:

   a base substrate (10);
   a source-drain metal extending portion (11), arranged on the base substrate (10), and the source-drain metal extending portion (11) extending from the display area (1) to the cathode contact regions (21) of the peripheral area (2);
   a passivation layer (12), arranged on a layer where the source-drain metal extending portion (11) locates, and the passivation layer (12) having a plurality of via holes at positions corresponding to the cathode contact regions (21);
   an anode metal extending portion (13), arranged on the passivation layer (12), and the anode metal extending portion (13) extending from the display area (1) to the cathode contact regions (21) of the peripheral area (2) and being electrically connected with the source-drain metal extending portion (11) through the via holes;
   a pixel definition layer (14), arranged on a layer where the anode metal extending portion (13) locates, and the pixel definition layer (14) having a plurality of successively arranged first patterns (100) at positions corresponding to the display area (1), each of the first patterns (100) having a protrusion portion (102) and a groove portion (101); the pixel definition layer (14) having a plurality of successively arranged second patterns (200) at positions corresponding to the cathode contact regions (21), each of the second pattern (200) having a protrusion portion (202) and a groove portion (201), wherein the protrusion portion (102) of the first pattern (100) corresponds to the groove portion (201) of the second pattern (200), and the groove portion (101) of the first pattern (100) corresponds to the protrusion portion (202) of the second pattern (200).

2. The OLED substrate according to claim 1, wherein a width of the protrusion portion (102) of the first pattern (100) is same as a width of the groove portion (201) of the second pattern (200), and a width of the groove portion (101) of the first pattern (100) is same as a width of the protrusion portion (202) of the second pattern (200).

3. The OLED substrate according to claim 1, further comprising a light emitting material layer (15), wherein the light emitting material layer (15) is arranged in the groove portion (101) of the first pattern (100) and on the protrusion portion (202) of the second pattern (200).

4. The OLED substrate according to claim 3, further comprising a cathode and a cathode metal extending portion (16) connected with the cathode, wherein the cathode and the cathode metal extending portion (16) are arranged on the light emitting material layer (15), and the cathode is arranged in the display area (1), the cathode metal extending portion (16) extends from the display area (1) to the cathode contact regions (21) of the peripheral area (2) and is connected with the anode metal extending portion (13) through the groove portion (201) of the second pattern (200).

5. The OLED substrate according to any one of claims 1 to 4, further comprising an anode arranged in the display area (1), wherein the anode is arranged in a same layer as the anode metal extending portion (13) and is disconnected from the anode metal extending portion (13).

6. A manufacturing method of an OLED substrate, comprising:

   forming, on a base substrate (10), a pattern comprising a source-drain metal extending portion (11) through a patterning process, wherein the source-drain metal extending portion (11) extends from a display area (1) to cathode contact regions (21) of a peripheral area (2);
   forming a passivation layer (12) on the base substrate (10) where the above step has been performed, and forming a plurality of via holes at positions corresponding to the cathode contact regions (21) in the passivation layer (12) through a patterning process;
   forming, on the base substrate (10) where the above steps have been performed, a pattern

comprising an anode metal extending portion (13) through a patterning process, wherein the anode metal extending portion (13) extends from the display area (1) to the cathode contact regions (21) of the peripheral area (2) and is electrically connected with the source-drain metal extending portion (11) through the via holes;
forming a pixel definition layer (14) on the base substrate (10) where the above steps have been performed, and forming a plurality of successively arranged first patterns (100) at positions corresponding to the display area (1) in the pixel definition layer (14) through a patterning process, each of the first patterns (100) having a protrusion portion (102) and a groove portion (101), forming a plurality of successively arranged second patterns (200) at positions corresponding to the cathode contact regions (21) of the peripheral area (2) in the pixel definition layer (14), each of the second pattern (200) having a protrusion portion (202) and a groove portion (201), wherein the protrusion portion (102) of the first pattern (100) corresponds to the groove portion (201) of the second pattern (200), and the groove portion (101) of the first pattern (100) corresponds to the protrusion portion (202) of the second pattern (200).

7. The manufacturing method of an OLED substrate according to claim 6, wherein a width of the protrusion portion (102) of the first pattern (100) is same as a width of the groove portion (201) of the second pattern (200), and a width of the groove portion (101) of the first pattern (100) is same as a width of the protrusion portion (202) of the second pattern (200).

8. The manufacturing method of an OLED substrate according to claim 6, wherein after the step of forming the pixel definition layer (14), the method further comprises:
forming a light emitting material layer (15), wherein the light emitting material layer (15) is formed in the groove portion (101) of the first pattern (100) and on the protrusion portion (202) of the second pattern (200).

9. The manufacturing method of an OLED substrate according to claim 8, wherein the light emitting material layer (15) is formed by continuous printing.

10. The manufacturing method of an OLED substrate according to claim 9, wherein after the step of forming the light emitting material layer (15), the method further comprises:
forming a pattern comprising a cathode and a cathode metal extending portion (16) connected with the cathode through a patterning process, wherein the cathode and the cathode metal extending portion (16) are arranged on the light emitting material layer (15), and the cathode is arranged in the display area (1), the cathode metal extending portion (16) extends from the display area (1) to the cathode contact regions (21) of the peripheral area (2) and is connected with the anode metal extending portion (13) through the groove portion (201) of the second pattern (200).

11. The manufacturing method of an OLED substrate according to claim 6, wherein an anode is further formed while forming the anode metal extending portion (13), wherein the anode is arranged in a same layer as the anode metal extending portion (13) and is disconnected from the anode metal extending portion (13).

12. A display device, comprising an OLED substrate according to any one of claims 1 to 5.

Patentansprüche

1. OLED-Substrat, unterteilt in einen Displaybereich (1) und einen Peripheriebereich (2) um den Displaybereich (1) herum, wobei der Peripheriebereich (2) mehrere Kathoden-Kontaktregionen (21) aufweist, wobei das OLED-Substrat Folgendes umfasst:

ein Basissubstrat (10);
einen sich erstreckenden Source-Drain-Metallabschnitt (11), der auf dem Basissubstrat (10) angeordnet ist, und wobei sich der erstreckende Source-Drain-Metallabschnitt (11) von dem Displaybereich (1) zu den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) erstreckt;
eine Passivierungsschicht (12), die auf einer Schicht angeordnet ist, auf der sich der sich erstreckende Source-Drain-Metallabschnitt (11) befindet, und wobei die Passivierungsschicht (12) mehrere Durchgangslöcher in Positionen aufweist, die den Kathoden-Kontaktregionen (21) entsprechen;
einen sich erstreckenden Anoden-Metallabschnitt (13), der auf der Passivierungsschicht (12) angeordnet ist, und wobei der sich erstreckende Anoden-Metallabschnitt (13) sich von dem Displaybereich (1) zu den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) erstreckt und elektrisch mit dem sich erstreckenden Source-Drain-Metallabschnitt (11) durch die Durchgangslöcher verbunden ist;
eine Pixel-Definitionsschicht (14), die auf einer Schicht angeordnet ist, auf der sich der sich erstreckende Anoden-Metallabschnitt (13) befindet, und wobei die Pixel-Definitionsschicht (14) mehrere nacheinander angeordnete erste Strukturen (100) an Positionen aufweist, die

dem Displaybereich (1) entsprechen, wobei jede der ersten Strukturen (100) einen überstehenden Abschnitt (102) und einen Rillenabschnitt (101) aufweist; wobei die Pixel-Definitionsschicht (14) mehrere nacheinander angeordnete zweite Strukturen (200) in Positionen aufweist, die den Kathoden-Kontaktregionen (21) entsprechen, wobei jede der zweiten Strukturen (200) einen überstehenden Abschnitt (202) und einen Rillenabschnitt (201) aufweist, wobei der überstehende Abschnitt (102) der ersten Struktur (100) dem Rillenabschnitt (201) der zweiten Struktur (200) entspricht, und der Rillenabschnitt (101) der ersten Struktur (100) der überstehenden Struktur (202) der zweiten Struktur (200) entspricht.

2. OLED-Substrat nach Anspruch 1, wobei eine Breite des überstehenden Abschnitts (102) der ersten Struktur (100) dieselbe ist wie eine Breite des Rillenabschnitts (201) der zweiten Struktur (200), und eine Breite des Rillenabschnitts (101) der ersten Struktur (100) dieselbe ist wie eine Breite des überstehenden Abschnitts (202) der zweiten Struktur (200).

3. OLED-Substrat nach Anspruch 1, ferner umfassend eine Licht emittierende Materialschicht (15), wobei die Licht emittierende Materialschicht (15) in dem Rillenabschnitt (101) der ersten Struktur (100) und auf dem überstehenden Abschnitt (202) der zweiten Struktur (200) angeordnet ist.

4. OLED-Substrat nach Anspruch 3, ferner umfassend eine Kathode und einen sich erstreckenden Kathoden-Metallabschnitt (16), der mit der Kathode verbunden ist, wobei die Kathode und der sich erstreckende Kathoden-Metallabschnitt (16) auf der Licht emittierenden Materialschicht (15) angeordnet sind, und die Kathode in dem Displaybereich (1) angeordnet ist, wobei der sich erstreckende Kathoden-Metallabschnitt (16) sich von dem Displaybereich (1) zu den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) erstreckt und mit dem sich erstreckenden Anoden-Metallabschnitt (13) durch den Rillenabschnitt (201) der zweiten Struktur (200) verbunden ist.

5. OLED-Substrat nach einem der Ansprüche 1 bis 4, ferner umfassend eine Anode, die in dem Displaybereich (1) angeordnet ist, wobei die Anode in einer selben Schicht wie der sich erstreckende Anoden-Metallabschnitt (13) angeordnet und von dem sich erstreckenden Anoden-Metallabschnitt (13) getrennt ist.

6. Herstellungsverfahren eines OLED-Substrats, umfassend:

Bilden, auf einem Basissubstrat (10), einer Struktur, die einen sich erstreckenden Source-Drain-Metallabschnitt (11) aufweist, durch einen Strukturierungsprozess, wobei der sich erstreckende Source-Drain-Metallabschnitt (11) sich von einem Displaybereich (1) zu Kathoden-Kontaktregionen (21) eines Peripheriebereichs (2) erstreckt;

Bilden einer Passivierungsschicht (12) auf dem Basissubstrat (10), auf dem der obige Schritt durchgeführt wurde, und Bilden mehrerer Durchgangslöcher an Positionen, die den Kathoden-Kontaktregionen (21) entsprechen, in der Passivierungsschicht (12), durch einen Strukturierungsprozess;

Bilden, auf dem Basissubstrat (10), auf dem die obigen Schritte durchgeführt wurden, einer Struktur, umfassend einen sich erstreckenden Anoden-Metallabschnitt (13) durch einen Strukturierungsprozess, wobei der sich erstreckende Anoden-Metallabschnitt (13) sich von dem Displaybereich (1) zu den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) erstreckt und elektrisch mit dem sich erstreckenden Source-Drain-Metallabschnitt (11) durch die Durchgangslöcher verbunden ist;

Bilden einer Pixel-Definitionsschicht (14) auf dem Basissubstrat (10), auf dem die obigen Schritte durchgeführt wurden, und Bilden mehrerer nacheinander angeordneter erster Strukturen (100) in Positionen, die dem Displaybereich (1) entsprechen, in der Pixel-Definitionsschicht (14), durch einen Strukturierungsprozess, wobei jede der ersten Strukturen (100) einen überstehenden Abschnitt (102) und einen Rillenabschnitt (101) aufweist, Bilden mehrerer nacheinander angeordneter zweiter Strukturen (200) in Positionen, die den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) entsprechen, in der Pixel-Definitionsschicht (14), wobei jede der zweiten Strukturen (200) einen überstehenden Abschnitt (202) und einen Rillenabschnitt (201) aufweist, wobei der überstehende Abschnitt (102) der ersten Struktur (100) dem Rillenabschnitt (201) der zweiten Struktur (200) entspricht, und der Rillenabschnitt (101) der ersten Struktur (100) dem überstehenden Abschnitt (202) der zweiten Struktur (200) entspricht.

7. Herstellungsverfahren eines OLED-Substrats nach Anspruch 6, wobei eine Breite des überstehenden Abschnitts (102) der ersten Struktur (100) dieselbe ist wie eine Breite des Rillenabschnitts (201) der zweiten Struktur (200), und eine Breite des Rillenabschnitts (101) der ersten Struktur (100) dieselbe ist wie eine Breite des überstehenden Abschnitts (202) der zweiten Struktur (200).

8. Herstellungsverfahren eines OLED-Substrats nach Anspruch 6, wobei nach dem Schritt des Bildens der Pixel-Definitionsschicht (14) das Verfahren ferner umfasst:
Bilden einer Licht emittierenden Materialschicht (15), wobei die Licht emittierende Materialschicht (15) in dem Rillenabschnitt (101) der ersten Struktur (100) und auf dem überstehenden Abschnitt (202) der zweiten Struktur (200) gebildet ist.

9. Herstellungsverfahren eines OLED-Substrats nach Anspruch 8, wobei die Licht emittierende Materialschicht (15) durch Endlosdruck gebildet ist.

10. Herstellungsverfahren eines OLED-Substrats nach Anspruch 9, wobei nach dem Schritt des Bildens der Licht emittierenden Materialschicht (15) das Verfahren ferner umfasst:
Bilden einer Struktur, die eine Kathode und einen sich erstreckenden Kathoden-Metallabschnitt (16) umfasst, der mit der Kathode verbunden ist, durch einen Strukturierungsprozess, wobei die Kathode und der sich erstreckende Kathoden-Metallabschnitt (16) auf der Licht emittierenden Materialschicht (15) angeordnet sind, und die Kathode in dem Displaybereich (1) angeordnet ist, wobei der sich erstreckende Kathoden-Metallabschnitt (16) sich von dem Displaybereich (1) zu den Kathoden-Kontaktregionen (21) des Peripheriebereichs (2) erstreckt und mit dem sich erstreckenden Anoden-Metallabschnitt (13) durch den Rillenabschnitt (201) der zweiten Struktur (200) verbunden ist.

11. Herstellungsverfahren eines OLED-Substrats nach Anspruch 6, wobei eine Anode ferner gebildet wird, während der sich erstreckende Anoden-Metallabschnitt (13) gebildet wird, wobei die Anode in einer selben Schicht wie der sich erstreckende Anoden-Metallabschnitt (13) angeordnet ist und von dem sich erstreckenden Anoden-Metallabschnitt (13) getrennt ist.

12. Displayvorrichtung, umfassend ein OLED-Substrat nach einem der Ansprüche 1 bis 5.

Revendications

1. Substrat à OLED, divisé en une zone d'affichage (1) et une zone périphérique (2) autour de la zone d'affichage (1), la zone périphérique (2) ayant une pluralité de régions de contact de cathode (21),
dans lequel le substrat à OLED comprend :

un substrat de base (10) ;
une portion d'extension métallique de source-drain (11), agencée sur le substrat de base (10), la portion d'extension métallique de source-drain (11) s'étendant depuis la zone d'affichage (1) jusqu'aux régions de contact de cathode (21) de la zone périphérique (2) ;
une couche de passivation (12), agencée sur une couche où la portion d'extension métallique de source-drain (11) se trouve, la couche de passivation (12) ayant une pluralité de trous d'interconnexion à des positions correspondant aux régions de contact de cathode (21) ;
une portion d'extension métallique d'anode (13), agencée sur la couche de passivation (12), la portion d'extension métallique d'anode (13) s'étendant depuis la zone d'affichage (1) jusqu'aux régions de contact de cathode (21) de la zone périphérique (2) et étant électriquement connectée à la portion d'extension métallique de source-drain (11) par l'intermédiaire des trous d'interconnexion ;
une couche de définition de pixel (14), agencée sur une couche où la portion d'extension métallique d'anode (13) se trouve, la couche de définition de pixel (14) ayant une pluralité de premiers motifs agencés successivement (100) à des positions correspondant à la zone d'affichage (1), chacun des premiers motifs (100) ayant une portion de protubérance (102) et une portion de rainure (101) ; la couche de définition de pixel (14) ayant une pluralité de seconds motifs agencés successivement (200) à des positions correspondant aux régions de contact de cathode (21), chacun des seconds motifs (200) ayant une portion de protubérance (202) et une portion de rainure (201), dans lequel la portion de protubérance (102) du premier motif (100) correspond à la portion de rainure (201) du second motif (200), et la portion de rainure (101) du premier motif (100) correspond à la portion de protubérance (202) du second motif (200).

2. Substrat à OLED selon la revendication 1, dans lequel une largeur de la portion de protubérance (102) du premier motif (100) est la même qu'une largeur de la portion de rainure (201) du second motif (200), et une largeur de la portion de rainure (101) du premier motif (100) est la même qu'une largeur de la portion de protubérance (202) du second motif (200).

3. Substrat à OLED selon la revendication 1, comprenant en outre une couche de matériau électroluminescent (15), dans lequel la couche de matériau électroluminescent (15) est agencée dans la portion de rainure (101) du premier motif (100) et sur la portion de protubérance (202) du second motif (200).

4. Substrat à OLED selon la revendication 3, comprenant en outre une cathode et une portion d'extension métallique de cathode (16) connectée à la cathode, dans lequel la cathode et la portion d'extension mé-

tallique de cathode (16) sont agencées sur la couche de matériau électroluminescent (15), et la cathode est agencée dans la zone d'affichage (1), la portion d'extension métallique de cathode (16) s'étend depuis la zone d'affichage (1) jusqu'aux régions de contact de cathode (21) de la zone périphérique (2) et est connectée à la portion d'extension métallique d'anode (13) par l'intermédiaire de la portion de rainure (201) du second motif (200).

5. Substrat à OLED selon l'une quelconque des revendications 1 à 4, comprenant en outre une anode agencée dans la zone d'affichage (1), dans lequel l'anode est agencée dans une même couche que la portion d'extension métallique d'anode (13) et est déconnectée de la portion d'extension métallique d'anode (13).

6. Procédé de fabrication d'un substrat à OLED, comprenant :

la formation, sur un substrat de base (10), d'un motif comprenant une portion d'extension métallique de source-drain (11) par l'intermédiaire d'un processus de formation de motif, dans lequel la portion d'extension métallique de source-drain (11) s'étend depuis une zone d'affichage (1) jusqu'à des régions de contact de cathode (21) d'une zone périphérique (2) ;
la formation d'une couche de passivation (12) sur le substrat de base (10) où l'étape ci-dessus a été réalisée, et la formation d'une pluralité de trous d'interconnexion à des positions correspondant aux régions de contact de cathode (21) dans la couche de passivation (12) par l'intermédiaire d'un processus de formation de motif ;
la formation, sur le substrat de base (10) où les étapes ci-dessus ont été réalisées, d'un motif comprenant une portion d'extension métallique d'anode (13) par l'intermédiaire d'un processus de formation de motif, dans lequel la portion d'extension métallique d'anode (13) s'étend depuis la zone d'affichage (1) jusqu'aux régions de contact de cathode (21) de la zone périphérique (2) et est électriquement connectée à la portion d'extension métallique de source-drain (11) par l'intermédiaire des trous d'interconnexion ;
la formation d'une couche de définition de pixel (14) sur le substrat de base (10) où les étapes ci-dessus ont été réalisées, et la formation d'une pluralité de premiers motifs agencés successivement (100) à des positions correspondant à la zone d'affichage (1) dans la couche de définition de pixel (14) par l'intermédiaire d'un processus de formation de motif, chacun des premiers motifs (100) ayant une portion de protubérance (102) et une portion de rainure (101),
la formation d'une pluralité de seconds motifs agencés successivement (200) à des positions correspondant aux régions de contact de cathode (21) de la zone périphérique (2) dans la couche de définition de pixel (14), chacun des seconds motifs (200) ayant une portion de protubérance (202) et une portion de rainure (201), dans lequel la portion de protubérance (102) du premier motif (100) correspond à la portion de rainure (201) du second motif (200), et la portion de rainure (101) du premier motif (100) correspond à la portion de protubérance (202) du second motif (200).

7. Procédé de fabrication d'un substrat à OLED selon la revendication 6, dans lequel une largeur de la portion de protubérance (102) du premier motif (100) est la même qu'une largeur de la portion de rainure (201) du second motif (200), et une largeur de la portion de rainure (101) du premier motif (100) est la même qu'une largeur de la portion de protubérance (202) du second motif (200).

8. Procédé de fabrication d'un substrat à OLED selon la revendication 6, dans lequel, après l'étape de la formation de la couche de définition de pixel (14), le procédé comprend en outre :
la formation d'une couche de matériau électroluminescent (15), dans lequel la couche de matériau électroluminescent (15) est formée dans la portion de rainure (101) du premier motif (100) et sur la portion de protubérance (202) du second motif (200).

9. Procédé de fabrication d'un substrat à OLED selon la revendication 8, dans lequel la couche de matériau électroluminescent (15) est formée par impression continue.

10. Procédé de fabrication d'un substrat à OLED selon la revendication 9, dans lequel, après l'étape de la formation de la couche de matériau électroluminescent (15), le procédé comprend en outre :
la formation d'un motif comprenant une cathode et une portion d'extension métallique de cathode (16) connectée à la cathode par l'intermédiaire d'un processus de formation de motif, dans lequel la cathode et la portion d'extension métallique de cathode (16) sont agencées sur la couche de matériau électroluminescent (15), et la cathode est agencée dans la zone d'affichage (1), la portion d'extension métallique de cathode (16) s'étend depuis la zone d'affichage (1) jusqu'aux régions de contact de cathode (21) de la zone périphérique (2) et est connectée à la portion d'extension métallique d'anode (13) par l'intermédiaire de la portion de rainure (201) du second motif (200).

11. Procédé de fabrication d'un substrat à OLED selon

la revendication 6, dans lequel une anode est en outre formée durant la formation de la portion d'extension métallique d'anode (13), dans lequel l'anode est agencée dans une même couche que la portion d'extension métallique d'anode (13) et est déconnectée de la portion d'extension métallique d'anode (13).

12. Dispositif d'affichage, comprenant un substrat à OLED selon l'une quelconque des revendications 1 à 5.

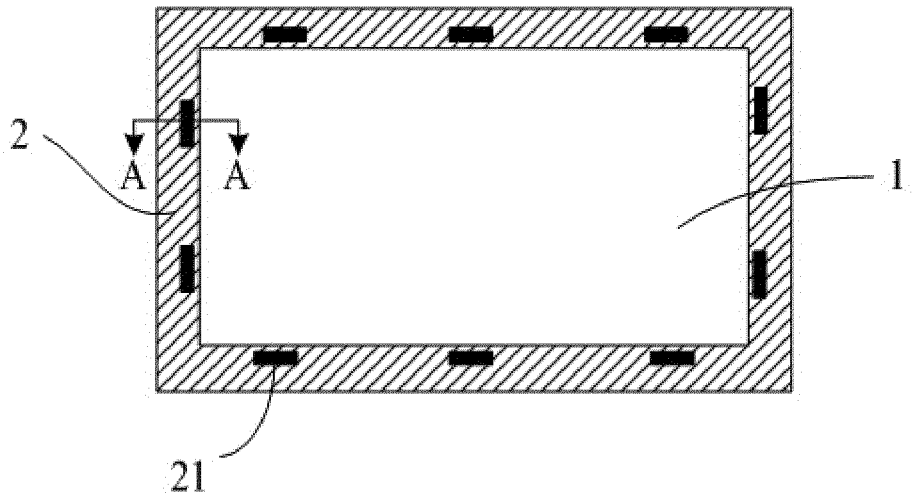
2
A
A
1
21

Fig. 1

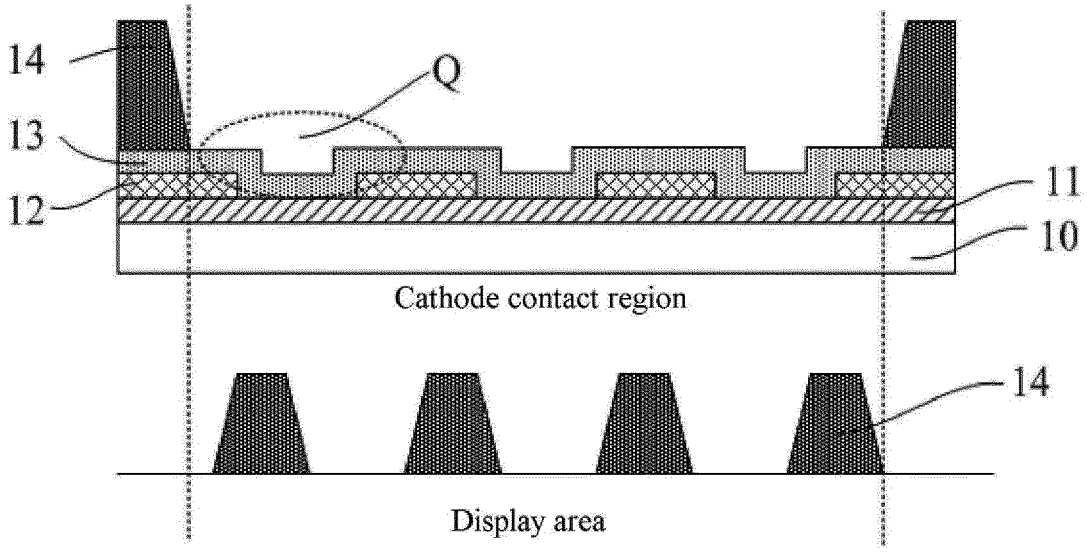
14
Q
13
12
11
10
Cathode contact region
14
Display area

Fig. 2

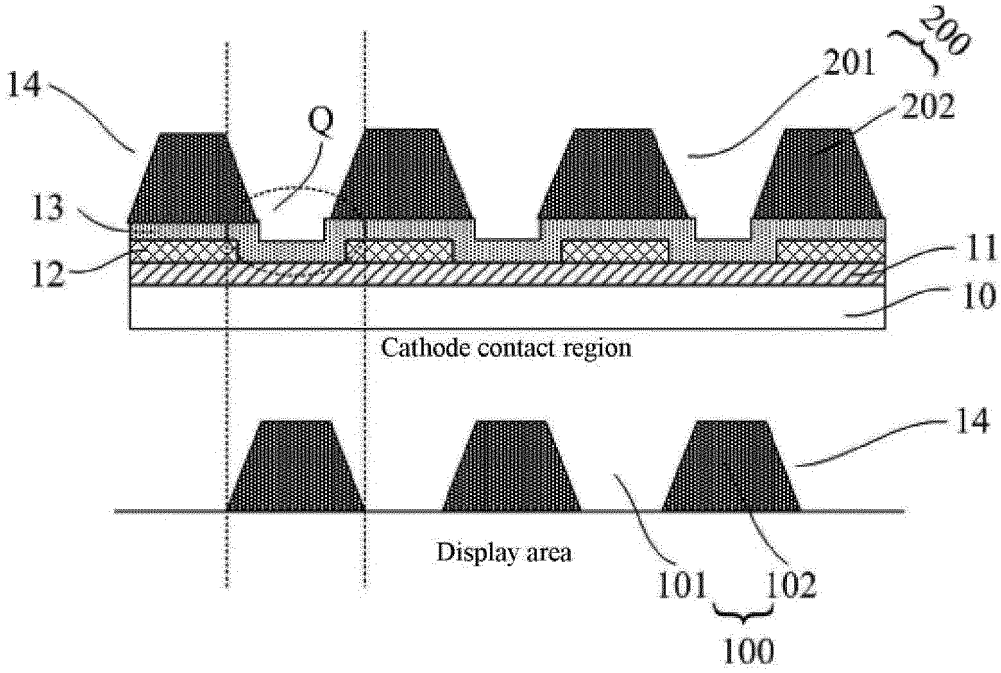

Fig. 3

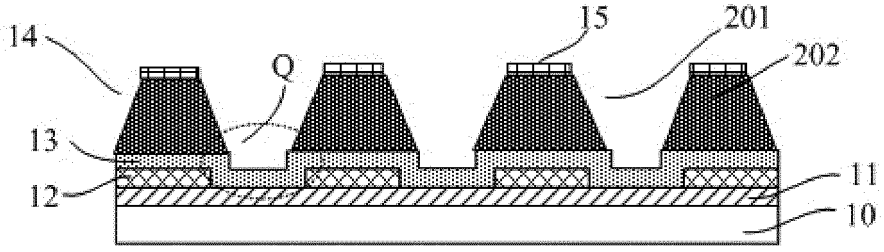

Fig. 4

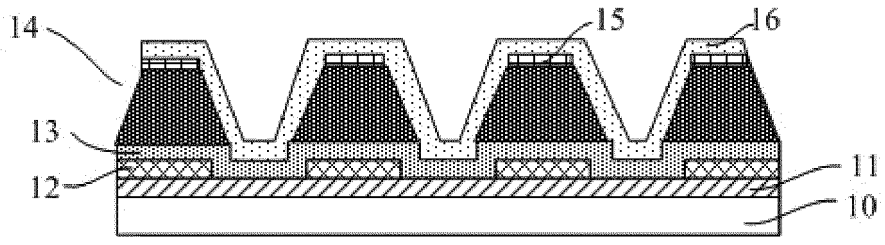

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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